P138

Semi-contact AFM for surface characterisation in case of holographic PDADMAC films and functionalised paper

S. Vasilev[1,2], D. Vasileva[2], O. Luneva[3], A. Vodyakshin[3], D. Chezganov[2], V. Yuzhakov[2], V.Ya. Shur[2], E. Skorb[3], A. Vinogradov[3]

[1]*Department of Chemical science, Bernal Institute, University of Limerick, Limerick, V94 T9PX, Ireland*
semen.vasilev@ul.ie

[2]*School of Natural Sciences and Mathematics, Ural Federal University, 620000 Ekaterinburg, Russia*

[3]*ITMO University, 191002 St. Petersburg, Russia*

Atomic-Force Microscopy (AFM) is very popular method for investigation and surface characterisation of soft materials. This non-damaging method allows to investigate the sample surface in nanoscale with high resolution.

In this work, we investigated surface of holographic polyelectrolyte films and functionalised paper using atomic force microscope MFP 3D (Asylum, USA).

Free standing polyelectrolyte films exhibit reversible shape transitions, such as bending or stretching. They are very promising for such applications as artificial muscles, cantilevers, sensors and actuators. A freestanding film is not supported with substrate like silicon wafer or glass slide. In addition, polyelectrolyte films tend to be semiconductors. Nowadays, the development prospects and benefits of organic semiconductors from inorganic ones are noticeable. In this work the results of surface characterization in nanoscale of poly(sodium 4-styrenesulfonate)/ poly(diallyldimethylammonium chloride) (PSS/PDADMAC) films will be presented (Fig. 1a).

We also studied the surface of the paper functionalised by the most promising methods that allow creating weak adhesion paper sheets. The surface of four sheets of paper with different coating was investigated. The coating agents were polystyrene, polyethylene vinyl acetate, polyvinyl alcohol and carboxymethyl cellulose. The smallest adhesion was found on the paper functionalised by polyethylene-vinyl acetate. It can be explained by peculiar morphology organized with nanoscale roughness (Fig. 1b).

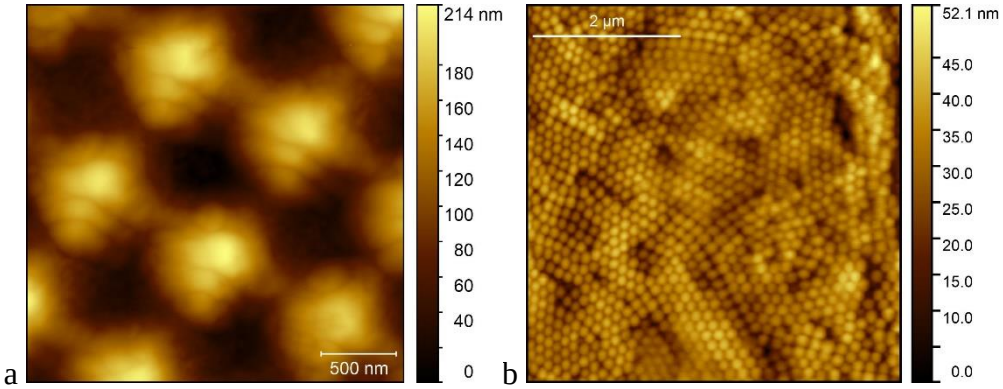

Figure 1. Semi-contact AFM topography images of: (a) holographic PDADMAC film, (b) paper functionalised by polyethylene-vinyl acetate.

The research was carried out using equipment of the Ural Center for Shared Use "Modern Nanotechnologies" Ural Federal University. A. Vinogradov acknowledges the scholarship of the President of the Russian Federation (SP-1158.2019.1): S. Vasilev acknowledges the mobility programs of the Institute of Natural Sciences and Mathematics for the Young scientists in the 2018 year.